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1982 Accomplishments Report to the Secretary of Agriculture

Agricultural Research, Extension and Teaching Accomplishments

Prepared by the Joint Council on Food and
Agricultural Sciences



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The Joint Council on Food and Agricultural Sciences was established under the authorization of Section 1407 of Title XIV of the Food and Agriculture Act of 1977 and extended by the Agriculture and Food Act of 1981. The enacting legislation charges the Joint Council with the responsibility to bring about more effective research, extension, and teaching in the food and agricultural sciences.

The report was prepared under the guidance of the Executive Committee of the Joint Council.

Staff assistance provided by Larry R. Miller, Executive Secretary to the Joint Council.

For copies of this report, please write to--

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Issued January 1983

JOINT COUNCIL ON FOOD AND AGRICULTURAL SCIENCES

Secretariat:
Rm. 351A, Admin. Bldg.
U.S. Department of Agriculture
Washington, D.C. 20250

December 27, 1982

Honorable John R. Block
Secretary of Agriculture
Washington, D.C. 20250


Dear Mr. Secretary:


The Joint Council is required by Section 1407, Public Law 97-113, as amended by Public Law 97-98, to submit to the Secretary of Agriculture a summary specifying ongoing research, extension, and teaching programs, accomplishments of those programs, and future expectations.

We are pleased to submit the 1982 Accomplishments Report of the Joint Council on Food and Agricultural Sciences.

The enclosed report summarizes selected examples of research, extension, and teaching accomplishments and future program expectations. Examples of progress of the Joint Council in bringing about more effective research, extension, and teaching by improved planning and coordination are also included.

Sincerely,


ORVILLE G. BENTLEY
Cochairman


JAMES H. ANDERSON
Cochairman

Enclosure

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EXECUTIVE SUMMARY

The Joint Council on Food and Agricultural Sciences, established under authorization of Title XIV of the Food and Agriculture Act of 1977 and extended by the 1981 act, has the primary responsibility of bringing about more effective research, extension, and teaching by improving planning and coordination.

This report presents a description of the food and agricultural sciences system, provides representative examples of program accomplishments for 1982, contains a review of the response of the Council to the legislative responsibilities, and includes expectations of the research, extension, and teaching programs.

In 1982 numerous significant advances were reported by the food and agricultural science and education system. This report illustrates the diversity of programs and types of accomplishments by including examples of accomplishments for each of the broad program categories: natural resources; production and protection; processing, marketing, and distribution; people and communities; agricultural policy; and general administrative and program support.

Its enacting legislation charges the Joint Council with the responsibility to provide a forum for the

interchange of information, analyze and evaluate program impacts, determine needs and priorities, and review the effectiveness of the food and agricultural system. This report summarizes several Council activities over the past five years which have resulted in more effective research, extension, and teaching in response to the legislation. ✓

The Joint Council devoted most of the April 1982 meeting to establishing priorities for research and education. Regional priorities were developed and aggregated into national priorities and presented to the Secretary of Agriculture.

The Council in 1982 sponsored an activity to summarize in a report the trends and projections of research programs for 1981-86. Cooperation of the National Agricultural Research Committee and the four Regional Research Planning Committees resulted in the combined judgments necessary for this report.

Also listed are expected significant breakthroughs and new initiatives which will affect future accomplishments of the research, extension, and teaching programs. These expectations derive from new technology or information on the near horizon and planned changes in resource allocation to address the most important problems and opportunities.

INTRODUCTION

The U.S. food and agriculture sector continues to contribute significantly to the national economy and to the promotion of the health and welfare of the people. This is largely because of the sector's superb scientific, technological and educational base that provides the expertise necessary to meet both domestic and export demands. So that farmers, ranchers, forest producers, agribusiness personnel and consumers can use new knowledge and technology, a teaching and extension network must link the science of agriculture with its producers and ultimate users.

Perhaps the greatest strengths of the food and agricultural science and education system (see figure) are the decentralized authority, independent decisionmaking processes, and the formal and informal linkages that permit planning and coordination among the participants.

States, Federal agencies, and private entities operate differently to serve their clientele. Strong communication networks enable scientists to stay aware of the work of their peers. These same networks give administrators and managers information to make intelligent decisions.

Financial support for this complex, decentralized system comes from several sources: State, Federal, local, private, and nonprofit organizations. Most funding is from State and Federal appropriations, through entitlements, formula distributions, direct and competitive grants, and line-item budgets to institutions in the State/Federal partnership.

This partnership has its legislative roots in the Land-Grant Act of 1862 (the first Morrill Act). This

Act granted Federal land to every State that agreed to establish at least one college to teach agriculture and the "mechanical arts" as well as other scientific and classical subjects. The second Morrill Act of 1890 added the black public colleges and institutions in 16 Southern States to the land-grant system.

The Hatch Act created the State agricultural experiment stations in 1887. In 1914, the Extension Service was established--to provide instruction and demonstrations in agriculture and home economics and related subjects. President Lincoln's charter to the Department of Agriculture in 1862 stressed practical studies, the first R&D effort in the U.S. Government.

These landmark pieces of legislation created the unique partnership among the U.S. Department of Agriculture, individual State and county governments, and land-grant colleges and experiment stations.

The Food and Agriculture Acts of 1977 and 1981 moved participation in food and agricultural science and education beyond USDA and the land-grant colleges. It recognized explicitly the need to coordinate better the work within this system among Federal agencies, between USDA and States, and with the private sector. The legislation also authorized participation of non-land-grant universities to join the partnership. The Joint Council on Food and Agricultural Sciences was established and given the responsibility of bringing about more effective research, extension, and teaching by improving planning and coordination, building on the linkages already in existence.

The U.S. Food and Agricultural Science and Education System

COOPERATIVE STATE INSTITUTIONS:

- Land-grant colleges or universities in each state as authorized by Act of 1862, plus 16 colleges of 1890 and Tuskegee Institute with programs of higher education in food and agricultural sciences.
- Fifty-eight State agricultural experiment stations (many with networks of substations) plus 16 schools of forestry, plus certain schools of home economics and veterinary medicine with research programs partially supported by Federal formula funds. Research spending (all sources) was 853 million dollars in FY 1980 involving 7,102 science years of research effort.
- Cooperative Extension Services in all 50 states plus the District of Columbia and U.S. territories. With total funding at approximately \$854 million last year, Cooperative Extension programs involved almost 17,000 professional staff years plus nearly 5,500 paraprofessional staff years, plus significant inputs by volunteers.

OTHER COLLEGES AND UNIVERSITIES:

- Approximately 50 non-land-grant, State-supported colleges or universities with programs of higher education, research and outreach in food and agricultural sciences.
- Other public and private institutions of higher learning ranging from major multidisciplinary universities to specialized vocational centers or institutes.

USDA RESEARCH/EDUCATION AGENCIES:

- The Agricultural Research Service with funding of \$426 million in FY 1982 involving 2,738 science years of research at 147 locations in the United States and abroad; also includes the Office of Higher Education with programs directed toward strengthening scientific and professional expertise.
- The Cooperative State Research Service with funding of \$221 million in FY 1982 mainly channeled to the cooperating State research system on formula basis; also includes competitive and special research grants and Federal administration.
- The Extension Service with funding of \$315 million in FY 1982, mainly channeled to the Cooperative Extension system; also includes Federal administration.
- The National Agricultural Library funded at \$8 million in 1982 for wide-ranging library and technical information services.
- The Economic Research Service with funding of \$40 million for FY 1982, for about 440 SY's of economic and social science research and analysis.
- The Forest Service (research divisions) with funding of \$110 million in FY 1982 provided nearly 950 SY's of research in resource management and utilization plus resource protection functions.
- Other USDA agencies with limited but direct R&E roles:

Office of International Cooperation and Development
 The Soil Conservation Service
 The Agricultural Marketing Service
 Office of Transportation
 The Agricultural Cooperative Service
 The Statistical Reporting Service

OTHER FEDERAL AGENCIES:

- At least 14 Federal Departments, Commissions, and independent agencies besides USDA either conduct research and education programs closely related to agriculture and forestry or provide funds to support programs in the USDA-State system. Total funding for such programs in FY 1982 estimated at approximately \$700 million.

PRIVATE FIRMS:

- Research and development (R&D) performed by equipment, seed, fertilizer, and other input suppliers: producing, processing and distributing operations; and specialized private R&D firms. No hard data on total funding or specific personnel are available. (Recent estimates of food and agricultural research conducted by private firms was approximately \$2.5 billion, larger than the USDA-State research system funding.)

- Technical information dissemination similar to some functions of Extension performed by field personnel or buyers of farm commodities, dealers of farm inputs, and trade journals or publications including the farm press and specialized technical information or consulting firms.

OTHER PRIVATE ORGANIZATIONS:

- Foundations or similar organizations which facilitate or channel funds to research and/or education programs in the public sector. Funding from these sources is estimated at \$20 million annually.
- Associations formed by private firms to conduct research and/or educational programs for their members.

ACCOMPLISHMENTS OF THE FOOD AND AGRICULTURAL RESEARCH, EXTENSION, AND TEACHING PROGRAMS

The U.S. food and agricultural science and education system and its research, extension, and teaching programs are complex and diverse. As a result, their accomplishments vary considerably in scope and impact. Selected examples of accomplishments illustrating this variety appear below.

This year's accomplishments can be linked closely to the priorities identified in the Joint Council's report, "Research and Education Priorities,"^{1/} issued in June 1982. The major priority identified by the Joint Council was to maintain and improve the capacity of the food and agricultural research and education system to meet the needs of users. Specific emphases were: fundamental research; expertise development; soil, water, and forestry management and conservation; plant, animal, and forestry production efficiency; rapid information delivery systems; family resource management; factors affecting foreign trade; and farm income.

The accomplishments also reflect the major thrusts that were addressed in the Joint Council's report, "Proposed Initiatives for the Food and Agricultural Sciences: 1981-86,"^{2/} issued in January 1981.

The accomplishments below are organized by the six broad categories of the common program structure:

- Natural Resources
- Production and Protection
- Processing, Marketing, and Distribution
- People and Communities
- Agricultural Policy
- General Administration and Program Support

Natural Resources

Research, extension, and teaching programs are conducted to develop technology for using and conserving soil, water, and air resources while sustaining optimum agricultural productivity. Much of this activity deals with developing management systems and strategies that optimize the production of food and fiber, minimize the adverse effects of agricultural systems on the environment, and assure the efficient use of our soil, water, and air resources for future generations.

Water Conservation

Water may be the main limiting resource in future crop production. Farmers and State agricultural experiment station scientists

want the best use of the water available to agriculture for growing crops. University of Arizona researchers have developed a precise way of making hourly and daily evapotranspiration estimates from a crop in a field. This method enables scientists to tell much more precisely the rate of water use on irrigated fields, as well as consumption in natural plant communities. This knowledge will aid in finding ways to irrigate cropland more precisely and to predict plant growth and development in range and forestlands.

Continuous Crop Production

Through the Agency for International Development, North Carolina State University's Tropical Soils Research Program received funds to improve technologies for continuous crop production on marginal soils normally subjected to shifting cultivation in the humid tropics. Research has been conducted in collaboration with Peruvian scientists in the upper Amazon jungle basin in Peru. To date, the improved technologies based on judicious lime and fertilizer amendments have enabled 27 consecutive crops to be produced economically from the same plot of land. Traditional technology allowed only two crops.

Soil Erosion Control

An economic analysis shows that soil erosion, a major problem in the middle portion of the Snake River Basin in Idaho, causes almost 7 million tons of soil to be lost annually. On more than half of the one million acres of irrigated cropland in the study area, soil losses are more than the natural soil formation process can replace.

These losses are especially damaging because irrigated cropland is the most productive and valuable land in the area. Application of conservation practices such as sprinkler irrigation, contour farming, use of terraces, and reduced tillage could reduce erosion by 1.2 to 1.4 million tons per year, a reduction of 17 to 20 percent. A planned program of erosion control on one-half million irrigated acres would produce net benefits of \$10 million annually. This analysis provides information valuable to decision makers relative to land use.

Efficient Use of Lower Quality Timber

An interdisciplinary research team at Colorado State University developed a reliable method (based on a geometric model) to predict the strength of structural sawn wood products containing growth defects, such as knots, cross grain, and checks. The model was extended to predict the tensile strength of structural lumber. Good agreement was attained between predicted strengths and those measured at the U.S. Forest Products Laboratory in Madison, Wisconsin, on structural lumber tested in tension. The results will be of significant value in stretching the Nation's wood supply by more efficient use of low-quality timber.

Better and Less Expensive House Construction

The Forest Products Laboratory of the Forest Service in cooperation with the University of Wisconsin introduced a new construction system, truss-framed houses. Manufacturers and builders are

planning to offer the "truss-framed system" to potential homebuyers as a lower cost alternative to the conventionally built home. A truss-framed system lets a house be built stronger, faster, and cheaper than with other methods. The system uses up to 30 percent less structural framing lumber than conventionally built houses.

Control of Pine Disease

Fusiform rust of slash and loblolly pines is one of the most damaging forest tree diseases in the United States. The disease limits successful management of these trees on several million acres in the southern United States, resulting in losses estimated to exceed \$100 million annually. Forest Service researchers and cooperators have developed slash and loblolly pines genetically resistant to fusiform rust. Losses of loblolly can be reduced 40 percent, and for slash pine, 50 percent, resulting in millions of dollars of savings.

Use of Remote Sensing for Agriculture

USDA continued efforts to apply aerospace remotely sensed data to high-priority information needs in agriculture and renewable resources. The interdepartmental program, to determine how aerospace remote sensing data can be used to improve USDA systems is a cooperative venture of USDA with the National Aeronautics and Space Administration and the Departments of Commerce and the Interior. Applications are being tested for early warning of change in production and quality of commodities and renewable resources, crop production forecasts, land use classification and renewable resources

inventory, conservation practices assessment, and pollution detection and impact assessment.

Foreign Ownership of U.S. Agricultural Land Studied

At the end of 1981, foreigners owned or were part owners of 12.7 million acres, or slightly less than 1 percent of all privately owned U.S. agricultural land. Forestland accounted for 56 percent of all foreign-owned acreage. U.S. corporations that are 5 percent or more foreign-owned held 64 percent of the foreign-held acreage. Investors from Canada, France, United Kingdom, Federal Republic of Germany, and Netherlands Antilles owned 78 percent of the foreign-held acreage. Nationally, the quantity of foreign-owned agricultural land is too small to measure the impacts on agriculture. Research showed there were little differences between practices used by domestic and foreign owner-operators.

Production and Protection

Increased crop and animal productivity from land, labor, capital, water, and energy inputs is essential. Agricultural productivity, which grew at an annual rate of 2.1 percent between 1939 and 1965, has since fallen to 1.7 percent. Crop and animal research and education programs increase production efficiency and reduce losses to provide adequate quantities of high quality food, feed, and fiber.

Much research currently concentrates on understanding what plant and animal growth processes can be altered to increase the efficiency of food and fiber production.

Role of Zinc in Plant Cells

Evidence discovered by Agriculture Research Service research scientists suggests that zinc (Zn) has a vital role in cell membrane integrity. Lack of sufficient Zn in bathing root cells causes them to leak solutes and lose turgidity. This new Zn function could apply directly in certain areas of stress physiology research, particularly tolerance to plant stress.

Rice and Crawfish Production Combined

Double-cropping systems for rice and crawfish developed by Louisiana agricultural scientists use the same land in the same year. Rice field waste after harvest feeds crawfish in the winter and spring. The double cropping with rice following crawfish the second year cut fuel consumption about 30 percent because traditional soil preparation was unnecessary while the crawfish kept weeds and grasses under control by eating them. Rains provide the water needed for the crawfish and the early rice season.

Desert Shrub Being Cultivated

Jojoba is a potentially valuable plant because its seeds contain a versatile liquid usable in cosmetics and lubricants and as a substitute for sperm whale oil in industrial uses. A California Agricultural Experiment Station plant geneticist working with the wild plant Jojoba has developed a self-pollinating strain with male and female flowers on the same plant. This new Jojoba may be a major breakthrough in domesticating and propagating the native desert shrub.

New, High-yield Potato

A new potato variety showing a market yield of 84 percent No. 1 potatoes was recently released by the Colorado State University Experiment Station. Named Sangre, the new variety was developed cooperatively by CSU, the U.S. Department of Agriculture and the University of Idaho Experiment Station.

The new variety has high yield, superior storage and cooking characteristics, and abundant flavor. Due to its adaptability to a wide range of growing conditions in the United States, the Sangre is also expected to result in a major new seed potato market for Colorado growers.

Soybeans Resistant to Corn Earworm

Field and laboratory screening at the University of Maryland Eastern Shore has revealed three soybean lines with partial resistance to corn earworm, in the form of a nonpreference for leaf feeding. One of the lines also indicates an antibiosis effect that keeps the larvae small and prolongs their development. It is rare to develop a variety which is immune to insect attack. Yet such levels of partial resistance can have a marked impact on insect populations, especially where more than one generation occurs per season.

New Antibodies for Plant Disease Control

Monoclonal antibodies to such plant viruses as Prunus necrotic ring-spot, apple mosaic, tobacco streak, and alfalfa mosaic have been developed with the new hybridoma procedures. These highly specific,

high-quality antibodies can be used to identify and do quantitative assays of plant viruses and diagnose virus diseases.

Pesticide Resistance Sought

Scientists at the New Jersey Agricultural Experiment Station have turned up an enzyme that detoxifies the herbicide propanal, used on rice, as it enters the plant cells. This same enzyme is not active in pest weeds. These scientists have located and purified the rice enzyme. Their discovery could lead to breeding and identifying plants best suited for pest control with particular herbicides. Perhaps specific pesticide resistance can be added to the cells of critically important crop plants.

Improved Pesticide Application

A sprayer developed by agricultural engineers at Georgia's Agricultural Experiment Station can put out small spray droplets with a negative electrical charge. The positively charged ground and plants attract the droplets and these envelop the leaves of crops. Thus, the amount of pesticide sprayed on cotton, for example, can be cut as much as 50 percent from the recommended rate and still provide the same control. Widespread use of this electrostatic sprayer could reduce the amount of chemicals necessary for pest control.

Progress is being made to develop new and improved technologies for increasing productivity so that effective and efficient food production and agricultural systems can improve production efficiency.

Evaluation of Pesticides

The National Agricultural Pesticide Impact Assessment Program (NAPIAP) involves a pesticide assessment by commodity on corn and soybeans in the major producing states. The intent is to provide objective, accurate data, to evaluate use of selected pesticides, based on expertise in extension, research, and the private sector. Extension Service has provided the leadership in this assessment in cooperation with the Economic Research Service, Cooperative State Research Service, and Agricultural Research Service.

Avoidance of Chemical Residues

Extension Service is cooperating with the Food Safety Inspection Service (FSIS) in 35 projects in 32 states to help farmers avoid chemical residue violations in their slaughter animals and milk. The workshops and educational materials are being funded with FSIS pass-through funds.

Increased Fertility

Ergonovine, a smooth muscle stimulant injected into female rabbits and sheep near the time of insemination, caused a ten-fold increase in the number of sperm in the uterus and oviducts 2 or 3 hours later and increased the rate of ova fertilization. These studies by ARS scientists should lead to methods of increasing fertility in farm animals.

Integrating Approaches

Integrated Reproduction Management (IRM) has a goal to improve food-animal reproductive efficiency and increase productivity and profitability of animal production by

integrating multiple disciplines and functions. The Extension Service plays a significant role in managing the USDA-IRM Coordinating Panel that will guide State, regional, and national IRM program development, and will evaluate State and regional IRM planning and development.

Swine Semen Preservation

ARS scientists developed two methods for preserving swine semen now available to swine producers for use in artificial insemination. The freezing procedure and the Beltsville Freezing Extender (BF-5) are being used by commercial organizations in North America to ship boar semen to more than 40 countries.

Agreement for Dairy Herd Improvement

The Extension Service and the Agricultural Research Service finalized a new Memorandum of Understanding for the administration of the National Cooperative Dairy Herd Improvement Program (NCDHIP) with National DHIA, the Cooperative Extension Services of each state, and USDA's Extension Service and ARS. A total of 65,873 herds with 4,790,180 cows on test are involved -45 percent of U.S. dairy cows. A total of 1,411 dairy goat herds are also in the program.

Improved Embryo Transfer Techniques

Twin calves produced at Colorado State University (CSU), through new embryo splitting and transfer techniques, show the way to greatly increased efficiency in beef and dairy industries. The new technique involves non-surgical recovery of embryos from donor

cows, splitting them, and transferring them into recipient mothers. This results in two major benefits: it greatly increases the possible rate of reproduction by superior cows; and because of the embryo splitting, it provides genetically identical animals which will also greatly expedite research on other opportunities for more efficient, lower cost beef and dairy production.

Vaccine for Pseudorabies in Swine

Significant pig reproductive failures (resorbed embryos and stillborn or mummified pigs) result from pseudorabies, a herpes disease that can kill all young swine infected, and porcine parvovirus infection. ARS scientists have developed and tested an inactivated bivalent vaccine for these two viruses. It prevents both, and should reduce vaccination costs to producers.

Vaccines for Cattle Diseases

Two new vaccines have been developed for use in cattle. One for infectious keratoconjunctivitis and one for respiratory syncytial virus will lower production loss from the former disease and death loss from the latter disease.

Processing, Marketing, and Distribution

Research, extension and teaching programs are being conducted to increase the information and knowledge base needed to maximize the efficiency of handling agricultural and forest products during processing, marketing and distribution.

These activities focus on the portion of the agricultural system between harvest of food and fiber products and their ultimate use by the consumer. Programs include food protection during marketing and distribution, food quality, and safety, technology and safety of non-food agricultural products.

Frozen Milk Concentrate

Wisconsin Agricultural Experiment Station scientists have perfected a frozen milk concentrate. The reconstituted product, which tastes like fresh milk, would have reduced shipping costs and longer storage life, and less spoilage would occur. Lactose-free milk can also be manufactured in frozen concentrate form.

Detection of Exotic Pests

A better security system for the Animal and Plant Health Inspection Service to use to exclude exotic pests is being developed. It will depend on X-ray imaging and chemical sensing to find fruit, vegetables, meat, and other pest carriers concealed in packages and baggage.

Treatment of Strawberries for Export

Fumigation with ethyl formate, a natural fumigant, could control western flower thrips on fresh strawberries. Killing all live insects on strawberries meets Japanese quarantine requirements and permits U.S.-grown strawberries to be exported to Japan.

Minor-use Pesticides

The Minor-use Pesticide Program was established to aid in securing registrations for pesticides used

so little that their research and development costs are greater than any possible return to the manufacturer. Thus far this year, Program data have supported the registration of products for 35 food-use needs and 548 ornamental-use needs. In addition, Program staff have petitioned for exceptions from the tolerance requirement in four cases: (1) use of modified atmospheres to control stored-product insects on all raw and processed agricultural commodities, (2) use of alfalfa looper virus to control caterpillars on cabbage and lettuce, (3) use of methyl eugenol + malathion to control oriental fruit fly on all raw agricultural commodities, and (4) use of gamma radiation to control insects infesting all raw agricultural commodities.

Toxic Metal Movement in the Food Chain

Researchers from Prairie View A&M University studied concentrations of cadmium, lead, and nickel in the soil near large cities; retention of these metals in diverse soils; and uptake or absorption of these metals by plants and animals. They used path analysis techniques to assess the movement of the metals along the soil-root-top pathway in grass. They also measured residual levels of metal in contaminated soil. This research provides a better understanding of how toxic metal transfer occurs in the agricultural food chain. Path analysis makes it possible to quantify the relationships in the agricultural food chain.

People and Communities

The programs in People and Communities while not directly involved with production, processing, and marketing of food and fiber products do contribute significantly to the efficient functioning of the food and agricultural sector of the American economy. Activities involve assisting rural communities to solve local problems; fostering human resource development; assisting youth in acquiring knowledge, developing life skills and farming attitudes; and determining human nutritional requirements.

Basic Family Nutrition Information

"Fit It All Together", a new 4-H food and nutrition project, is based on objectives and concepts identified by Extension Service 4-H staff and nutrition specialists and was developed in consultation with the National 4-H Food and Nutrition Developmental Committee appointed by the Extension Service 4-H staff. Committee members included youth development and curriculum specialists, nutrition experts, volunteer leaders, youth, and representatives from the private sector. The project introduces 9 to 12 year-olds and their families to basic nutrition information.

Factors Affecting Bone Calcification

Diets rich in fiber affect hormonal balance to favor bone calcification. Estrogens help form and maintain normal bone. The loss of bone density (osteoporosis) is a common consequence of aging, especially among women. Hormones

may determine the time of onset of bone loss, and diets rich in fiber may alter the estrogen levels and prevent or postpone the onset of bone density loss. These results emphasize that a person's nutrition can determine whether age-related degenerative changes occur.

Expanded Food and Nutrition Program

Review is progressing on the Expanded Food and Nutrition Program (EFNEP) in relation to findings and recommendations from recently completed studies, including the congressionally mandated study: "An Assessment of the Objectives, Implementation and Effectiveness of the EFNEP for Adults and 4-H Youth."

Volunteer Youth Leaders

Nearly 570,000 volunteer leaders participated in 4-H youth programs last year, providing valuable guidance to youth in their projects and activities. The average 4-H volunteer donates 220 hours per year in preparing for and teaching youth. Volunteers devote about \$1 billion a year to 4-H plus their out-of-pocket expenses.

Improved Information on Rural Housing

Housing research at North Carolina A&T State University has focused on providing people in rural North Carolina with better housing. Rising costs have forced low and lower middle income consumers to consider alternative types of housing, such as mobile homes. Study findings, publicized through a technical bulletin and consumer-oriented brochure, have drawn positive response from the manufactured housing industry and Extension agents.

Use of Energy in Households

Energy issues are in the foreground of critical concerns affecting the United States in the 1980's. The eleven-state project entitled Consequences of Energy Conservation Policies for Western Regional Households provides a perspective of how respondents representing 9,700 households feel about energy related policies, how they have and plan to conserve, and the adjustments made in their lives. The findings have been used to provide data to State and Federal agencies, to develop instructional content for the classroom and for Extension efforts. Specific applications of the data base have allowed the examination of the acceptance of energy policies, the motivations and actions to conserve and the potential for targeting information and progress to selected audiences. Further analysis of adjusting actions and rising energy costs will provide an understanding of families' resource management as it relates to energy and housing.

Rural Population Trends

Farm and rural population trends were studied by ERS. There were approximately 5.6 million people on U.S. farms in 1982 which represents a decline of 14 percent since 1978 when the current farm definition was adopted. Farm sales and consolidations, smaller farm families, and some movement of farm operators to town have reduced the farm population. Analysis of 1980 Census data has shown that in the last decade low income, rural, and small town counties retained or attracted population just about as much as did moderate or high income areas. In effect, people moving to rural communities in recent years

have not been moving to maximize income, but to improve the quality of life. Most rural counties reveal both an increase in the number of older people (65 plus) and an increase in the number of young adults (20-34 years).

Innovation in Family Resource Management

A special project in Indiana to develop a curriculum sourcebook in family resource management by early 1983 has been funded by USDA-Extension. Designed for Extension agents to assist families in planning and managing their finances, the Sourcebook supports one of the new initiatives in Home Economics, identified by the Congress in the National Agricultural Research, Extension, and Teaching Policy Act of 1977 and 1981. The project's advisory group represents expertise from ARS, CSRS, CES, and ES-USDA.

A second Extension innovation is the initiation of a "new model" of program support for the Cooperative Extension system. Family resource management specialists, one in each region, will spend about one-third of their time identifying and sharing expertise within their region and ultimately to all regions across the Nation. A fifth specialist will spend half-time identifying and sharing research and other information or data base sources pertinent to Extension needs.

Measures of Household Production

Home economists in several states working with the Family Economics Research Group of ARS developed several new methods for (1) measuring the extent to which households produce goods and

services for themselves and (2) estimating the economic value of this production. Researchers at the University of Wisconsin identified the types of household work most likely to be done while performing other tasks. This research will be useful in measuring the extent of household production. Researchers at the University of Missouri distinguished household activities into categories of production and consumption. At Ohio State University an alternative to expensive collection of household time use data was developed for valuing household food production. This method will provide an inexpensive way for estimating the dollar value of household production and help educators develop criteria on which to judge the cost-effectiveness.

Health Clinics Established

In a 12-county area of Alabama, county health councils have helped establish 12 health clinics which treated 15,000 people in 1 year in about 45,000 visits. Cooperative Extension provides organizational and leadership assistance. Thirty-three county councils have sponsored 66 projects and programs, including visual and hypertension screening, cancer awareness, home health care workshops, fluoridation, and dog and mosquito control.

Handicaps Identified

In Missouri, 554 volunteers screened 2,400 children to identify handicaps and locate services for them. They held conferences with 2,166 parents, and they referred 82 children for diagnostic work.

Vermont has saved an estimated 1.1 million gallons of oil since the Home Energy Outreach Advisor (HEAT) program began. HEAT, a cooperative effort of Extension and the State Energy office, has made 5,489 free onsite audits since the program's beginning. Followup postcard evaluation shows homeowners often carry out the low-cost or no-cost recommendations. Cooperative support from the Council on Aging and Community Action is helping HEAT to assist low-income and elderly Vermonters.

Agricultural Policy

Activities related to this program area are concerned with agricultural and food policy in general; demand, supply, and price analysis and forecasting; and development of domestic and foreign materials.

Analysis of World Trade

An analysis of world trade showed farm products grew from \$50 billion to \$230 billion in the past decade. Increased affluence and growth in population generated more growth in demand for bulk commodities such as grains and oilseeds than most countries could meet from their production. Increased affluence in a smaller circle of developed and middle-income countries generated even stronger demand for high value farm products (HVP). These products include highly processed foods such as butter, canned vegetables, and cigarettes; semi-processed items such as flour, animal feeds, and oilseed meal; and high valued unprocessed products such as eggs, fresh fruits, and nuts. The United

States succeeded in capturing almost two-thirds of the expansion in the low-value bulk trade. However, it was less successful in capturing growth in the HVP markets. To gain a larger share of this market, the United States must depend on more aggressive HVP marketing and trade policy initiatives to reduce the export subsidies and import restrictions abroad.

General Administration and Program Support

General administration and program support includes several different types of activities. They are: technical information systems, administrative and financial support, facilities support, and expertise development.

Accountability and Evaluation System

A revised Accountability and Evaluation System has been established by the Extension Service to respond to changing needs. The new system provides for a 4-year planning cycle rather than annual, beginning with the FY 1984-87. The system calls for three types of information: (1) impact studies, (2) program accomplishment reports, and (3) program input and participation information. Approximately 450 staff with key Extension program, evaluation, and administrative leadership responsibilities in the United States and territories participated in four regional and two national workshops on the new system.

Conferences by Satellite

Satellite conferences with two-way communication are now practical.

The Sewing by Satellite conference sponsored by Extension Home Economics/Human Nutrition/USDA, the American Home Sewing Association (which provided funding), and the American Home Economics Association was received at 25 sites by 6,000 professionals.

Electronic Mail System

Currently all but one state Extension Director is on the DIALCOM electronic mail system. Electronic mail is invaluable in meeting deadlines that constantly arise, ranging from budget data to copy for the Extension Review periodical.

Computerized Outlook Information

COIN, the Extension Service's nationwide Computerized Outlook Information Network, developed with VPISU, now contains four types of information accessed by Extension farm management or marketing specialists in 40 states.

Agricultural Communications

Fast Agricultural Communications Terminal System (FACTS) developed by Indiana Extension Service in cooperation with the Kellogg Foundation included, in 1982, a microcomputer at each county and area office in the State. The FACTS Garden Program, the first FACTS program marketed commercially, is used by over 20 states. An estimated 40,000 persons in these states planned their vegetable production with this program. AGNET, a joint effort among the Cooperative Extension Services of six states (Nebraska, Montana, North and South Dakota, Washington, and Wyoming), delivers computer power to solve management

problems to farmers, ranchers, and agribusiness in 37 states, Canada, and other foreign countries, with a library of more than 225 programs. Other computer networks include Michigan's TELPLAN and COMNET, Minnesota's MECC, and Virginia's CMN.

Technical Information Dissemination

The National Agricultural Library (NAL) is developing telecommunication systems to collect and disseminate technical information. The intent is to expand and strengthen national agricultural information networking. Bibliographic data in the form of remote offline input have been transmitted directed from Iowa State University to NAL via computer. The input records prepared and sent by Iowa were for the adult Cooperative Extension Services publications NAL is cataloguing for national distribution. NAL has begun providing Current Awareness Literature Services to USDA researchers in Saudi Arabia via high-speed satellite telecommunications link.

Information System for Higher Education

A critical need exists for a dynamic, comprehensive data base which will provide statistical information for effective planning and coordinating efforts directed toward supporting and strengthening higher education in the food and agricultural sciences. During the past year, USDA's Office of Higher Education has begun work with university and industry cooperators to develop a design and implementation plan for a Food and Agricultural Education Information System (FAEIS). Data for FAEIS represent a broad spectrum of the

U.S. higher education system in the food and agricultural sciences and of students/graduates (such as enrollment, degrees conferred, faculty, student support, cost of education, and employment demand). FAEIS accomplishments to date include tentative identification of user needs and proposed content, identification of existing data bases for inclusion in FAEIS and of additional data which will need to be collected, and preparation of requisite survey instruments.

ACCOMPLISHMENTS OF THE JOINT COUNCIL

The Joint Council on Food and Agricultural Sciences was established under authorization of Section 1407 of Title XIV of the Food and Agriculture Act of 1977. The Agriculture and Food Act of 1981 extends the authorization of the Joint Council for 5 more years. The primary responsibility of the Joint Council is to bring about more effective research, extension, and teaching by improving planning and coordination and by relating federal budget development and program management to these processes.

The Council is charged with the responsibilities to provide a forum for the interchange of information, to analyze and evaluate the economic, environmental and social impacts, to determine needs and high-priority areas, and to review the effectiveness of the food and agriculture system.

Response to Legislative Responsibilities

Throughout the past 5 years, the Joint Council has actively carried out responsibilities identified in the Food and Agriculture Acts of 1977 and 1981. Several representative examples of activities appear below.

Renewable Resources Plan Prepared

A 5-year national plan for renewable resources extension programs^{3/} was prepared to

respond to the need for an expanded, comprehensive renewable resources educational program. This report was coordinated with assessments mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) and the Resources Conservation Act of 1977 (RCA). Timber, forage, wildlife, soil erosion, water supply, and water quality were identified as continuing problems varying in severity. The 5-year program areas, funded with \$2 million during FY1982 to begin the expanded program in renewable resources, were Forestland management; harvesting, marketing, and processing wood products; rangeland management; fish and wildlife management; environmental management and public policy; and outdoor recreation.

National and Regional Planning Structure Established

A regional and national planning structure^{4/} was designed to improve and coordination of research, extension, and higher education. National committees in research, extension, and higher education were set up to coordinate activities. Four regional councils were established to aggregate and coordinate research, extension, and higher education.

These committees and councils enabled Federal and State programs and research, extension, and higher education activities to be considered jointly as programs are being planned and implemented.

Common Program Structure Developed

The Joint Council recognized the importance of a common national program structure to facilitate joint planning, management, and implementation of food and agriculture research and education programs. The program structure adopted has a program information classification system, which permitted the summarization of information to improve communication within the food and agricultural science system.^{5/}

The common program structure is being analyzed to determine how it can be integrated with other existing planning and reporting systems. The main advantage of such a system is the common classification and terminology which allows the various actors within the food and agricultural system to exchange information and to plan research and education activities.

Integrated Pest Management Symposium Held

During a symposium on planning and coordination of integrated pest management programs, the Council reviewed crop production, pest problems, climate and pest management, tillage practices, and the use of agrichemicals to control pest damage on crops. The Joint Council made recommendations to the Secretary regarding working group activities and the need for continuing research relative to integrated pest management programs.

Manpower Assessment Made

The Office of Higher Education within Science and Education, USDA

conducted a manpower assessment project^{6/} which examined the relationship between current and projected supply of, and demand for, graduates of higher education in the food and agricultural sciences. The first phase of the study published in 1980 involving a comprehensive supply/demand analysis, focused on degree levels and occupational employment of graduates of higher education in agriculture, natural resources, and veterinary medicine. The second phase of the project completed in 1981, focused on home economics: more than 20,000 copies of a bulletin^{7/} on opportunities in home economics were distributed to assist in recruiting scientists to meet expanding needs. During 1982, a third phase focused on the graduate supply and demand in relation to sex, background, and race.

Research Facility Needs Identified

The Joint Council responded to the congressional request in Section 1462, Public Law 95-113, to study the facilities needs of the food and agricultural research system. A Federal/State study group was appointed to obtain data on the current status of, and plans for, research facilities in accordance with State, regional, and national priority programs.^{8/} In addition, in response to Section 1462, Public Law 95-113, the Joint Council reported to the Secretary on policy issues related to facilities.

Human Nutrition Needs Evaluated

The Joint Council studied and evaluated current research, extension, and teaching programs in human nutrition. The study^{9/}

helped fulfill the congressional mandate to develop new initiatives for improving human nutrition and health-related nutrition programs in the United States, assisted USDA in clarifying its role as the lead Federal Agency in research, extension, and teaching in the food and agricultural sciences, and served as a basis for more effective planning within the system.

Small Farms Programs Studied

The small farms programs in the research, extension, and higher education sectors were also studied in 1979.^{10/} The Council laid out a rationale for continued assistance to small farm operators and made specific recommendations for strengthened coordination and increased funding for programs to solve problems unique to small farms.

Research Program Trends Analyzed

The National Agricultural Research Committee of the Joint Council and the four Regional Research Planning Committees sponsored an activity to summarize the trends and projections of research programs to 1986.^{11/} These trends provided input to the Joint Council, the USDA and the states for decisionmaking.

Areas of Emphasis Projected

The Joint Council developed projections of areas for increased emphasis in the food and agricultural sciences for the early eighties.^{11/} These projections served as a general guide and planning aid, plus a response to the congressional mandate under Title XIV of the 1977 Food and Agriculture Act. The issues and concerns that were provided to the

Secretary formed the framework for a listing of areas of emphasis for increased resource commitments over the next 5 years.

Priorities Established

The Joint Council devoted most of its April 1982 meeting to establishing priorities for research, extension, and teaching. Four regional groups were asked to develop regional priorities. The Council aggregated these into national priorities and presented them to the Secretary of Agriculture.^{1/}

The overall priority identified by the Council was: Maintaining and improving the capacity of the agricultural research and education system to meet the needs of the users.

Specific areas of national emphasis (not in priority order) were:

- fundamental research
- expertise development
- soil, water, and forestry management and conservation
- plant, animal, and forestry production efficiency
- rapid information delivery systems
- family resource management
- factors affecting foreign trade
- farm income

New Initiatives in Home Economics Developed

A comprehensive national plan for new initiatives in home economics, research, extension, and higher education was prepared.^{12/} The plan was developed to strengthen a national effort in home economics and provide a framework for

directing new program efforts to high-priority problems in four areas: family economic stability and security; energy and environment; food nutrition and health; and family strengths and social environment. It focused on population groups most in need of service and presented recommendations to improve coordination, cooperation, and integration of activity among research, extension, and higher education functions.

Extension Service Programs Evaluated

The Secretary of Agriculture was asked by Congress in the Food and Agriculture Act of 1977 to provide an evaluation of the economic and social consequences of the programs of the Extension Service and the Cooperative Extension Services. An extensive study^{13/} was made as a joint effort of the Department of Agriculture and the State Extension Services. An independent citizens panel reviewed the project report and provided comments. The evaluation provided a better understanding of the Extension's strong points, its limitations, and the issues it now must face.

Issue Papers Prepared for the Secretary

In the past 5 years, the Joint Council has provided numerous recommendations and issue papers to the Secretary's office and to the members of the food and agricultural system for consideration in policymaking and budget development. Examples include papers on:

- role of Assistant Secretary for Science and Education in coordinating research and education

- conducting strategic planning in a pluralistic, decentralized system
- implications of Agricultural Research Service shift toward basic research
- maintaining an adequate supply of individuals with expertise in the food and agricultural sciences for both public and private agencies and institutions
- role of food and agricultural science and education in international science and technology
- State/Federal partnership

Meetings with the Secretary's Office Held

The Joint Council met with each of the new Assistant Secretaries of Agriculture during 1981 to discuss their priorities and to get their perspectives on several issues.

In 1981 the Joint Council prepared responses to several questions on a variety of science and education issues reflecting the special interests and concerns of the Secretary of Agriculture. These responses were presented to and discussed with the Secretary.^{14/}

Planned Activities for 1983

The 1981 Agriculture and Food Act calls for the Secretary of Agriculture to prepare a long-term needs assessment for food, fiber, and forest products, and the research required to meet these needs. In addition, the Joint

Council is to prepare a 5-year plan based on problem identification of the needs assessment, and develop goals in a manner that will allow for evaluation of progress. The Council will prepare an annual priorities report linked to these two activities to include explicit statements of annual programs and priorities for the upcoming year. These statements will be derived from the goals of the 5-year plan, plus new developments since that plan was prepared.

The priorities report will recognize recommendations from regional and national committees of the Joint Council and user's Advisory Board recommendations. An annual accomplishments report will include scientific accomplishments for the past year that relate to the goals of annual priorities and of the 5-year plan.

The Joint Council considered several potential activities for 1983. The major emphasis will be placed on improving institutional relationships--the interaction among the Federal, State, and private institutions to help determine what role industry plays in research and technology transfer; and mechanisms to improve coordination and communication among private, State, and Federal institutions. This activity would require a review of the missions for research, extension, and teaching, and the roles of the partners in the system.

A second activity will emphasize collecting more information relative to human expertise development in the food and agricultural system. The Council will determine their role in helping provide an

ample supply of appropriately trained food and agricultural scientists and professionals.

A third activity will involve providing information systems to improve the credibility and accessibility of information in the food and agricultural system. The flow and exchange of information among the food and agricultural participants and users will be emphasized.

ACCOMPLISHMENTS OF THE NATIONAL COMMITTEES AND REGIONAL COUNCILS

National Agricultural Research Committee

A process was developed to continue the preparation of both regional and national 5-year projections of research priorities which will be used as input for the Joint Council. The process is based on the judgments of research administrators relative to the distribution of resources under assumptions of zero total change, and a 20-percent total change in resources.

Other Committee activities included: (1) a task group established by the Committee to prepare a definitive paper on basic research, (2) publishing of a brochure which explains the regional/national research planning process, (3) modifications in the Current Research Information System (CRIS) relative to RPG-5 and RPG-8 to reflect ongoing research activities and, (4) review of the social science classification system of CRIS, and (5) an improved crosswalk from CRIS to the common program structure is being developed.

National Extension Committee

The National Extension Committee activities include: (1) participation in the formulation of the June 1982 Report to the Secretary on Research and Education Priorities; (2) response to the User's Advisory Board reports and recommendations; (3) review of the document prepared

by the Extension Committee on organization and policy entitled "The Computer: Management Power for Modern Agriculture"; (4) Testimony by five members at oversight hearings of House subcommittee on Department Operations, Research and Foreign Agriculture; (5) Involvement in several additional activities including the development of the Extension's new accountability and evaluation system, development of national initiatives for Extension, and maintaining of direct linkage with the Extension staff at the Federal level.

National Committee on Higher Education

The subcommittee on Food and Agriculture Education Information System has refined project survey instruments for collecting faculty, student, and fiscal data pertaining to teaching programs in agriculture, forestry, home economics, and veterinary medicine. The faculty survey is targeted as the initial data collection effort. Data on race, sex, and ethnicity of graduates of higher education in the food and agricultural sciences have been analyzed and a publication on these results is forthcoming. The 1980 USDA publication, "Graduates of Higher Education in the Food and Agricultural Sciences, Volume 1"^{6/} will be updated.

The Northeast Higher Education Committee prepared a report titled "Securing America's Food and Agricultural Resource Base" that is being widely circulated.

Western Regional Council

The Western Agricultural Research Committee completed work on its report of "Priorities for Agricultural Sciences, Food, and Forestry Research Through 1986". Scientists and research administrators working with representative user groups identified these priorities: (1) increase productivity and efficiency of food and fiber systems; (2) expand supplies, protect quality, and improve use and conservation of water; (3) expand supplies and improve the use in conservation of energy; (4) improve the safety and nutritional quality of the food system; and (5) improve knowledge and technology for management and policy decisions.

The Western Higher Education Committee considered animal health related issues related to higher education.

The Western Extension Committee met several times and explored use of computers to make Extension activities more efficient and effective.

The Western Regional Council continued work on rangeland. It heard a report on "Coordinated Resource Management and Planning," a concept which brings users and performers together and makes decisions by consensus. The Council is now identifying the scientist years needed to address

the 18 issues listed in the Western Agricultural Research Committee Summary.

North Central Regional Council

The North Central Regional Council continued to review and analyze the computer systems, including the North Central Computer Institute. A resolution was passed asking the Institute, on behalf of the North Central Regional Council, to look into the public/private computer interface activities. There is a need for a better understanding of the activities in the private sector, including consultants, agribusiness firms, and the media. The Joint Council was asked to look into a simple procedure for coordinating and sharing computer advances among regions. The North Central Regional Council also recognized that most undergraduate students need to learn to use computers as part of their training.

Northeast Regional Council

During 1982, the Northeast functional committees for Higher Education, Research, and Extension were formed. The Northeast Higher Education Committee developed and adopted a report: "Securing America's Food and Agricultural Resource Base", which identifies educational problems in agriculture needing immediate attention. The report also contains recommendations and an action plan. The Council established and charged a Future Steering Committee to develop a major project to focus attention on Northeast food and agriculture industry in the

twenty-first century. This long-range planning effort will continue to be coordinated with the administrative heads of agriculture in the Northeast and other associated planning activities of the Council.

Southern Regional Council

The Council did not meet in 1982.

EXPECTATIONS OF THE FOOD AND AGRICULTURAL RESEARCH, EXTENSION, AND TEACHING PROGRAMS

The food and agricultural research, extension and teaching programs are expected to continue to provide significant accomplishments in the future. Programs are constantly adjusted to meet current and future priorities. Recent science and education accomplishments guide the direction of new technology development.

The agricultural science and education institutions are implementing new initiatives and redirections within food and agriculture programs. Some examples of new technology and adjustments, as reflected in the FY1983 budgets and coinciding with Joint Council priorities, appear below.

Basic Research on Plants and Animals

Basic research will be done to improve understanding of physiological and biochemical parameters of plants and animals. Specifically, researchers will focus on animal hormones, for controlling the reproductive process; the culture and transfer of embryos; and the potential of producing multiple births from a single zygote of determined sex.

In plants, scientists will study cellular and subcellular systems as to key biochemical pathways and their control mechanisms. Plant micro-organisms with desirable genetic sequences for a range of key pathways will be used to improve production efficiency. Monoclonal antibodies to plant

viruses will be used further for identification and diagnosis of plant viruses. Techniques will be developed to transfer desirable traits from their sources to commercial crop varieties or cropping systems.

Current research shows promise for long-term sustained release boluses to administer therapeutic agents and micronutrients to ruminant animals.

These results are expected to provide technology which can be used for improved research and improved production efficiency.

Under USDA/Office of International Cooperation and Development auspices, the University of Missouri and the Mexican National Institute for Agricultural Research have begun an investigation of pseudorabies, a viral infection of Mexican swine and potential serious threat to U.S. herds because of its virulence and proximity. The research will center on the virus' characteristics and behavior, improve diagnostic techniques, and determine the role of wild animals (such as rodents and birds) as carriers.

Forest and Forest Product Research and Extension

The southern pine beetle (SPB), the most destructive forest insect of pine and pine hardwood forests in the southern United States, occurs on 98 million acres of susceptible forests. The most effective control is to keep forests in a vigorous growing condition. A system to rank stands by susceptibility, now being implemented in several locations in the South,

will serve as a "litmus paper" to tell where SPB infestations are likely. The forest manager can then prescribe appropriate silvicultural practices.

The Forest Service Forest Products Laboratory has developed press-drying, a new concept in papermaking. Heat and pressure applied to the paper mat during drying bond the pulp fiber into high-strength paper products. Press-drying produces paper from hardwood fibers as strong as that from softwood, so 100-percent hardwood pulp can now be used for linerboard in corrugated boxes and other high-strength uses. The more abundant, lower priced hardwood pulp and recycled fiber, which requires less energy in pulp refining and drying operations can be used more widely than before, as can less refined, higher yield pulp. This new process stems from long-term basic research on the fundamental structure and properties of paper formation.

In 1983, research and Extension programs will focus on new technology and improved management to enhance forest productivity and to reduce losses from forest pests. Additional emphases include evaluation of the consequences of acid rain; biological control of forest pests; bioconversion of lignocellulosic materials to useful products; increased attention to international trade forecasting for timber products; improved educational programs to conserve soil and water, for example, expansion of minimum and no-till conservation practices; and the study of the economics of soil and water conservation.

Economic Research

Economic research will be directed to study of impacts of export marketing on trade policy; agricultural productivity; agricultural finance; and commodity situation and outlook analyses, especially in local communities.

Extension Programs

Extension program outreach in human nutrition will expand to improve the curriculum review of food and nutrition programs. The current reporting system on nutrition will be studied for improvements.

Agreements have been signed with States to expedite and coordinate the sharing of research findings, program delivery innovations, computer-assisted teaching and other sources in family resource management. This information will be introduced for use nationwide.

One Extension initiative is to speed up development of computer techniques for farmers in financial management. Many microcomputer programs are being developed. Electronic technology is being extended to other agencies to provide assistance in making farm loans, disseminating information on crop insurance, and providing information on farm-related legislation.

Human Expertise Development

A third manpower report is expected next year on the extent to which females and minorities constitute the students/graduates in the food and agricultural sciences. This information should be valuable for making decisions relative to expertise development. Other human

expertise development initiatives include strengthening the interface and mechanism for exchange between agricultural college faculty and cooperating industries.

Teaching and industry cooperators have identified curriculum development as a priority concern. At their request, the Office of Higher Education is assessing college curricula in agriculture and natural resources. Task forces will develop mechanisms to implement important innovations in courses and curricula.

International Programs

As U.S. universities strengthen the international elements of the agricultural science and education programs, system capacity to increase foreign trade will improve. Emphasis on and attitude toward international education continues to improve and lead to better allocation of agricultural resources.

Library Sciences

The National Agricultural Library (NAL) and the Extension Service have started a program to raise the information literacy level of rural people, specifically county librarians and Extension agents. In FY 1983, NAL will conduct, in cooperation with Extension, online training classes on the information systems, CRIS and AGRICOLA, for these people.

In 1982, as a result of a Secretary-level panel assessment of the NAL, the network of land-grant and other agricultural libraries received new impetus. NAL will be developing new policies and programs to improve coordination of information

services within USDA and the land-grant community. These efforts will include greater coordination of collection development, data base creation, document delivery, and reference services. New communications technology and innovative management techniques will be used.

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